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CENTRAL INTELLIGENCE AGENCY

## INFORMATION REPORT

50X1-HUM

COUNTRY USSR

REPORT

SUBJECT Soviet Research in the Surface Contribution to the Heat Capacities of Solids

DATE DISTR. 10 Sept 52

NO. OF PAGES 2

NO. OF ENCLS.

SUPP. TO  
REPORT NO.

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1. The fact that the USSR is perhaps 7 - 8 years ahead of the rest of the world in research concerning the heat of the surface to the heat capacity of solids became apparent in May 1952. For the past two years (1950-52), it has been rather fashionable to work on heat capacity effects of bulk materials as they occur on surfaces.

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2. a Soviet chemist named Tarrasov derived equations for the heat capacity of one and two dimensional molecules and used this to explain the experimental values for graphite at temperatures below 100°K. Tarrasov's work was published in English in Compt Rend. URSS, vol 46, p 20 and 110, way back in 1945.

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Since that discovery, references to similar work by the well-known Frankel of Leningrad and also research published by Breger and Zhukhovitski, all dating back to 1946.

3. Tarrasov's work is important and his paper is an excellent one -- important enough for a future publication of the Physical Chemistry Journal. The simple  $T^2$  equation used by Tarrasov,  $C_p = 86.5 (T/^\circ\text{C})^2$ , holds over a wide temperature range.

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Tarrasov's equations can be used to explain the experimental values for graphite at low temperature. [REDACTED]

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4. [REDACTED] there apparently have been no publications by Tarrasov since 1945 relating to this work. Although it is purely theoretical work, perhaps the Soviets have banned publication because of its potential importance in determining surface areas. The next step [REDACTED] is the use of cadmium iodide as the solid.

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5. Because the heat capacity of graphite can best be reproduced by an equation containing a  $T^2$  term, [REDACTED] now investigating the heat capacities at liquid helium temperature of films adsorbed on a compressed block of lampblack. The structure of these films is comparable to the layer structure of graphite. The major difficulty in heat capacity measurements at liquid helium temperatures is heat transfer through the material. At higher temperatures, helium gas can be used as the amount of adsorption is small, but below 4°K condensation will occur on the solid, and during a measurement some evaporation must take place involving a correction in the heat capacity. The advantage of using a charcoal block as an adsorbent is that this will act as a heater and thermometer. In this way, the heat will be generated in the adsorbent itself and the problem of heat transfer will disappear.

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